REMARKS

Claims 1-87 are pending. Claims 1-2, 4, 7, 13, 19, 33 and 59 are amended to more particularly point out and distinctly claim Applicants' invention.

Rejections based on 35 U.S.C. § 101

The Examiner rejected Claims 1, 2-5 and 19-32 under 35 U.S.C. § 101 as being directed to non-statutory subject matter. The Examiner's first basis of rejection is that the claims are not within technological art. However, the Examiner's rejection contradicts the *Interim Guidelines for Examination of Patent Applications for Patent Subject Matter Eligibility*, 1300 OG 142, November 22, 2005, which states:

> In Ex parte Lundgren, Appeal No. 2003-2088, Application 08/093,516, (Precedential BPAI opinion September 2005), the Board rejected the examiner's argument that Musgrave and Toma created a technological arts test. "We do not believe the court could have been any clearer in rejecting the theory the present examiner now advances in this case." Lundgren, at 8. The Board held that "there is currently no judicially recognized separate "technological arts" test to determine patent eligible subject matter under § 101." Lundgren at 9.
>
> USPTO personnel should no longer rely on the technological arts test to determine whether a claimed invention is directed to statutory subject matter. There is no other recognized exceptions to eligible subject matter other than laws of nature, natural phenomena, and abstract ideas.
>
> (emphasis added)

Thus, Applicants respectfully request that the Examiner withdraw his rejection of Claims 1, 2-5 and 19-32 under 35 U.S.C. § 101 based on the claims not being within the technological arts.

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The Examiner's second basis for rejecting Claims 1, 2-5 and 19-31 under 35 U.S.C. § 101 is that the claims are not limited to practical application. The Examiner states:

> Assuming that the claimed invention is carried out on a computer (i.e. rendering the claimed invention in the technological art), it is asserted that the Subject Matter as claimed fails produce a "useful, concrete and tangible result."
>
> Claims 1, 2, 4 and 19: recite an abstract idea "a method for summing integrals..." However, the claim fails to provide any practical application of the abstract idea. The claim recites summing the weighted pairs of I and Q correlation values at the target frequency. Mere computation of correlation values as claimed fails to produce a concrete and tangible result.
>
> Note that this exemplary analysis also applies to claims 1, 2, 4 and 19. The applicant is required to thoroughly review all claims in light of this analysis and take appropriate corrective action.

Applicants respectfully traverse the Examiner's rejection. Claims 1, 2, 4 and 19 each recite that the data handled by their methods are sampled data of a signal:

> 1. A method for summing integrals at a target frequency, the method comprising the steps of:
>
> accessing a set of pairs of I and Q correlation values corresponding to a set of data blocks, wherein:
>
> <u>the set of data blocks together make up a sampled data that is associated with a received signal</u>;
>
> * * *
>
> 2. A method for <u>summing integrals for sampled data of a signal</u>, the method comprising the steps of:
>
> * * *
>
> 4. A method for <u>summing integrals for sampled data of a signal</u>, the method comprising the steps of:
>
> * * *
>
> 19. A method for summing I and Q correlation integrals at a target frequency, the method comprising the steps of:
>
> accessing a set of pairs of I and Q correlation values corresponding to a set of data blocks and a set of frequencies, wherein:

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> the data blocks in the set of data blocks together make up a set of data that is associated with a received signal; and

(emphasis added)

As explained in Applicants' Specification, at page 1, lines 17-23, summing correlation integrals of a signal at a target frequency is used in known procedures, such as coherent processing:

> In one approach for estimating the carrier frequency, known as coherent processing, multiple candidate carrier frequencies are examined. For each candidate frequency, In Phase ("I") and Quadrature ("Q") correlation sums are calculated, followed by an evaluation of the sum of squares I.sup.2+Q.sup.2. The candidate frequency that results in the largest sum of squares is selected as the estimated carrier frequency. If the delay is an unknown quantity, then a two-dimensional search is performed to simultaneously estimate the delay and carrier frequency.

Thus, Applicants respectfully submit that Claims 1, 2, 4 and 19, and their dependent Claims 3, 5 and 20-32, each recite subject matter of practical application. Accordingly, Applicants respectfully request withdrawal of the Examiner's rejection of Claims 1, 2-5, and 19-32 under 35 U.S.C. § 101.

Rejections based on 35 U.S.C. § 112, second paragraph

The Examiner rejected Claims 1-87 under 35 U.S.C. § 112, second paragraph as being indefinite. The Examiner states:

> In claims 1, 2, 4, 19 in lines 1-2, respectively, recite "A method for summing (I and Q correlation) integrals at a target frequency..." and wherein the body of the claim does not refer back to the carrier frequency at a target frequency. Thus, the claim is indefinite as the claim does not recite how the summing integrals is related to the final step of the claims of "summing the weighted pairs of I and Q correlation values..."
>
> In claims 7, 33 and 59, in lines 1-2, respectively, recite "A

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method for estimating a carrier frequency at a target frequency..." and wherein the body of the claim does not refer back to the carrier frequency at a target frequency. Thus, the claim is indefinite as the claim does not recite how the estimating a carrier frequency is related to the final step of the claims of "summing the weighted pairs of 1 and Q correlation values..."

> Claims 3, 5, 8-18, 20-32, 34-58 and 60-87 directly or indirectly depend on claim 2, 4, 7, 19, 33 or 59.

Applicants respectfully submit that the Examiner is in error. Contrary to the Examiner's assertion, independent Claims 2, 4 and 59 do not recite the term "target frequency" in the preamble.

With respect to Claim 1, Claim 1 recites, in relevant part:

> selecting pairs of I and Q correlation values that correspond to the calculated pairs of I and Q correlation integrals that are calculated using a frequency from the set of frequencies that is close to <u>the target frequency</u> to be the selected pairs I and Q correlation values;
>
> weighting the selected pairs of I and Q correlation values according to a difference between the target frequency and the selected frequency to produce a set of weighted pairs of I and Q correlation values; and
>
> summing the weighted pairs of I and Q correlation values.
>
> (emphasis added)

Thus, contrary to the Examiner's assertion, Claim 1 recites in the body that the target frequency is used to select I and Q correlation values which are then weighted and summed. Similarly, Claim 19 recites:

> selecting pairs of I and Q correlation values that correspond to calculated pairs of I and Q correlation integrals that are calculated at a frequency from the set of frequencies that is close to <u>the target frequency</u> to be the selected pairs of I and Q correlation values;
>
> selecting weights for each selected pair of I and Q correlation values, based on the difference of the target frequency from the frequency at which the selected pairs of I and Q correlation values are calculated, and also based on the

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position of the data block that corresponds to the selected pair of I and Q correlation values;

weighting the selected pairs of I and Q correlation values according to the selected weights to produce a set of weighted pairs of I and Q correlation values; and

summing the weighted pairs of I and Q correlation values;

(emphasis added)

Claim 7 is now amended to recite the relationship between the target frequency and the estimated carrier frequency:

for every frequency interval of the second set of frequency intervals, determining a selected frequency in the first set of frequency intervals, wherein the selected frequency is close in value to the target frequency;

selecting I and Q correlation integrals corresponding to each selected frequency to be a selected pair of I and Q correlation values;

weighting the selected pairs of I and Q correlation values according to a difference between the selected frequency and the target frequency to produce a set of weighted pairs of I and Q correlation values;

summing the weighted pairs of I and Q correlation values to form summed weighted pairs of I and Q correlation values; and

estimating the carrier frequency from the summed weighted pairs of I and Q correlation values.

Contrary to the Examiner's assertion, Claim 33 already recites the relationship between the estimated carrier frequency and the target frequency:

Step D4: selecting weights for the selected pairs of I and Q correlation values, based on a difference between ~~the~~ a target frequency and the frequency at which the selected pairs of I and Q correlation values are calculated, and also based on the position of the data block that corresponds to the selected pair of I and Q correlation values;

Step D5: weighting the selected pairs of I and Q

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correlation values according to the selected weights to produce a set of weighted pairs of I and Q correlation values corresponding to the selected data block and the selected frequency;

Step D6: summing the weighted pairs of I and Q correlation values to produce a pair of I and Q correlation values associated with the current level, selected data block, and the selected frequency;

*   *   *

Step F: Estimating the carrier frequency on the basis of the pairs of I and Q correlation values associated with level R and with the frequencies in the set of candidate frequencies.

Thus, Applicants respectfully submit that Claims 1-87 fully comply with 35 U.S.C. § 112, second paragraph.

<u>Rejections based on 35 U.S.C. § 103(a)</u>

The Examiner rejected Claims 1, 7-18 and 19-32 under 35 U.S.C. § 103(a) as being unpatentable over U.S. Patent 6,735,243 ("Akopian") in view of U.S. Patent 5,566,202 ("Lang") and U.S. Patnet 6,628,969 ("Rilling"). With respect to independent Claims 1, 7 and 19, the Examiner states:

> Regarding claims 1 and 19, Akopian teaches a method for summing integrals at a target frequency of a plurality of target frequencies, the method comprising the steps of: accessing a set of correlation values corresponding to a set of data blocks (see Fig.5) wherein: the set of data blocks together make up a sampled data that is associated with a received signal (section 0 - section N_{Se} - 1); and each correlation values from the set of correlation values corresponds to a calculated correlation integrals that are integrated (combined or summed, note col. 10, line 22 in Fig.5) over one corresponding data block from the set of data blocks at a plurality of frequencies from a set of frequencies (w1-wk). However, Akopian does not teach selecting correlation values that is closest to the target frequency, but combines the correlation values for each of the frequencies.
>
> Lang teaches selecting (86,88 in Fig.2) correlation values that is closest to the target frequency (note col.2, lines 9-14 and col.3, line 40 - col.4, line 16). Therefore, it would have been obvious to one skilled in the art at the time of the invention to

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incorporate the teaching of Lang in the system of Akopian by selecting the correlation that is closest to the target frequency for the purpose of further executing the step of providing frequency compensation signal (output of 26 in Fig.1) through the selected correlation value, and thus control the timing of quantizing (in 14,16).

However, Akopian in view of Lang do not explicitly teach weighting and summing the selected correlation values, wherein each of the values are represented as I and Q values.

Rilling teaches receiving the selected correlation values (output of 20 in Fig.1) weighting (26) and summing (30) the weighted pairs of I and Q values. Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the teaching of Rilling in the system of Akopian in view of Lang by coupling the output of selector (MUX in Fig.2 of Lang) to the weighting step (26) for the purpose of producing a feedback signal to reduce interference, as taught by Rilling (note col.4, lines 6-8). And further, it would have been obvious to one skilled in the art at the time of the invention to incorporate the teaching of Rilling in the system of Akopian and Lang by computing the correlation values represented as I and Q values, as computation in any part of a transmitter or a receiver as in-phase or quadrant, as computation in I and Q values are well-known in the art as these values simplifies computation in any part of the system.

* * *

Regarding claims 7, 13 and 14, Akopian teaches a method for summing integrals at a target frequency of a plurality of target frequencies, the method comprising the steps of: accessing a set of correlation values corresponding to a set of data blocks (see Fig.5) wherein: the set of data blocks together make up a sampled data that is associated with a received signal (section 0 - section N_{Se} - 1); and each correlation values from the set of correlation values corresponds to a calculated correlation integrals that are integrated (combined or summed, note col. 10, line 22 in Fig.5) over one corresponding data block from the se of data blocks at a plurality of frequencies from a set of frequencies (w,-w_k). Akopian further teaches dividing the range of frequency into a first set of frequency intervals (coarse) and second set of frequency intervals (fine, note col.2, lines 4548 and 60-63 and col.8, lines 20-25).

However, Akopian does not teach selecting correlation values that is closest to the target frequency, but combines the correlation values for each of the frequencies.

Lang teaches selecting (86,88 in Fig.2) correlation values

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> that is closest to the target frequency (note col.2, lines 9-14 and col.3, line 40 - col.4, line 16). Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the teaching of Lang in the system of Akopian by selecting the correlation that is closest to the target frequency for the purpose of further executing the step of providing frequency compensation signal (output of 26 in Fig. 1) through the selected correlation value, and thus control the timing of quantizing (in 14,16).
>
> However, Akopian in view of Lang do not explicitly teach weighting and summing the selected correlation values, wherein each of the values are represented as I and Q values.
>
> Rilling teaches receiving the selected correlation values (output of 20 in Fig.1) weighting (26) and summing (30) the weighted pairs of I and Q values. Therefore, it would have been obvious to one skilled in the art at the time of the invention to incorporate the teaching of Rilling in the system of Akopian in view of Lang by coupling the output of selector (MUX in Fig.2 of Lang) to the weighting step (26) for the purpose of producing a feedback signal to reduce interference, as taught by Rilling (note col.4, lines 6-8). And further, it would have been obvious to one skilled in the art at the time of the invention to incorporate the teaching of Rilling in the system of Akopian and Lang by computing the correlation values represented as I and Q values, as computation in any part of a transmitter or a receiver as in-phase or quadrant, as computation in I and Q values are well-known in the art as these values simplifies computation in any part of the system.

Applicants respectfully traverse the Examiner's rejection. As amended, each of Claims 1, 7 and 19 recite summing correlation values using weights that relate to a difference between the target frequency and the selected frequency that is used to evaluate the correlation values:

> 1. A method for summing integrals at a target frequency, the method comprising the steps of:
>
> * * *
>
> selecting pairs of I and Q correlation values that correspond to the calculated pairs of I and Q correlation integrals that are calculated using a selected frequency from the set of frequencies that is close to the target frequency to be the selected pairs I and Q correlation values;

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weighting the selected pairs of I and Q correlation values according to a difference between the target frequency and the selected frequency to produce a set of weighted pairs of I and Q correlation values; and

summing the weighted pairs of I and Q correlation values.

7. A method for estimating a carrier frequency at a target frequency, the method comprising the steps of:

* * *

selecting I and Q correlation integrals corresponding to each selected frequency to be a selected pair of I and Q correlation values;

weighting the selected pairs of I and Q correlation values according to a difference between the selected frequency and the target frequency to produce a set of weighted pairs of I and Q correlation values; ~~and~~

summing the weighted pairs of I and Q correlation values-to form summed weighted pairs of I and Q correlation values; and

estimating the carrier frequency from the summed weighted pairs of I and Q correlation values.

19. A method for summing I and Q correlation integrals at a target frequency, the method comprising the steps of:

* * *

selecting pairs of I and Q correlation values that correspond to calculated pairs of I and Q correlation integrals that are calculated at a frequency from the set of frequencies that is close to the target frequency to be the selected pairs of I and Q correlation values;

selecting weights for each selected pair of I and Q correlation values, based on the difference of the target frequency from the frequency at which the selected pairs of I and Q correlation values are calculated, and also based on the position of the data block that corresponds to the selected pair of I and Q correlation values;

weighting the selected pairs of I and Q correlation values according to the selected weights to

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> produce a set of weighted pairs of I and Q correlation values; and
>
> summing the weighted pairs of I and Q correlation values.

However, at Rilling's col. 4, lines 6-8, on which the Examiner relied for his rejection, Rilling teaches:

> The adaptive array converges to a set of values for weights 26 that reduce the undesired interference signal(s) inside the selected channel bandpass to enhance reception of the desired signal.

Reducing undesired interference signals and enhancing reception of the desired signals bear relationship to neither the purposes nor the results recited in independent Claims 1, 7 and 19. Therefore, Rilling's teachings at col. 4, lines 6-8, cannot properly be combined with Akopian and Lang to achieve Claims 1, 7 and 19. Even if so combined, Rilling yields "weights that reduce the undesired interference signals," which is contrary to the weights recited in each of Claims 1, 7 and 19 that relate to a difference between the target frequency and a selected frequency. Therefore, there is no suggestion or motivation in the prior art to combine the teachings of Rilling with the teachings of Akopian and Lang, and even if so combined, their teachings do not meet the limitations of Claims 1, 7 and 19. Accordingly, Applicants respectfully submit that Claims 1, 7 and 19 and dependent Claims 8-18 and 20-32 are each allowable over the combined teachings of Akopian, Land & Rilling. Reconsideration and allowance of these claims are therefore requested.

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Conclusion

For the above reasons, Applicants believe that all claims (i.e., Claims 1-87) are allowable. If the Commissioner has any questions, the Commissioner is respectfully requested to telephone Applicants' attorney at (408) 392-9250.

I hereby certify that this correspondence is being deposited with the United States Postal Service as First Class Mail in an envelope addressed to: Commissioner for Patents, P.O. Box 1450, Alexandria, VA 22313-1450, on December 30, 2005.

12/30/2005

Attorney for Applicant(s) Date of Signature

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